attach to paper #10

EXHIBIT B

LINEAR TECHNOLOGY

LTC1709-8/LTC1709-9

2-Phase, 5-Bit VID, Current Mode, High Efficiency, Synchronous Step-Down Switching Regulators

FEATURES

- Single Controller Operates Two Output Stages: Antiphase Reducing Required Input Capacitance and Power Supply Induced Noise
- **Two 5-Bit Desktop VID Codes: LTC1709-8 For VRM8.4 (V_{OUT} from 1.3V to 3.5V) LTC1709-9 For VRM9.0 (V_{OUT} from 1.1V to 1.85V)**
- Current Mode Control Ensures Best Current Sharing
- **True Remote Sensing Differential Amplifier**
- **Power Good Output Indicator**
- OPTI-LOOP™ Compensation Minimizes C_{OUT}
- Programmable Fixed Frequency: 150kHz to 300kHz
- **±1% Output Voltage Accuracy**
- Wide V_{IN} Range: 4V to 36V Operation
- Adjustable Soft-Start Current Ramping
- Internal Current Foldback and Short-Circuit Shutdown
- Overvoltage Soft Latch Eliminates Nuisance Trips
- Low Shutdown Current: 20µA
- Available in 36-Lead SSOP Package

APPLICATIONS

- Workstations
- Internet Servers
- Large Memory Arrays
- DC Power Distribution Systems

DESCRIPTION

The LTC®1709-8/LTC1709-9 are 2-phase, VID programmable, synchronous step-down switching regulator controllers that drive two all N-channel external power MOSFET stages in a fixed frequency architecture. The 2-phase controller drives its two output stages out of phase at frequencies up to 300kHz to minimize the RMS ripple currents in both input and output capacitors. The 2-phase technique effectively multiplies the fundamental frequency by two, improving transient response while operating each channel at an optimum frequency for efficiency. Thermal design is also simplified.

An internal differential amplifier provides true remote sensing of the regulated supply's positive and negative output terminals as required for high current applications.

The RUN/SS pin provides soft-start and optional timed, short-circuit shutdown. Current foldback limits MOSFET dissipation during short-circuit conditions when the overcurrent latchoff is disabled. OPTI-LOOP compensation allows the transient response to be optimized for a wide range of output capacitors and ESR values. The LTC1709-8/LTC1709-9 implement two different VID tables compliant with VRM8.4 and VRM9.0 respectively.

TYPICAL APPLICATION

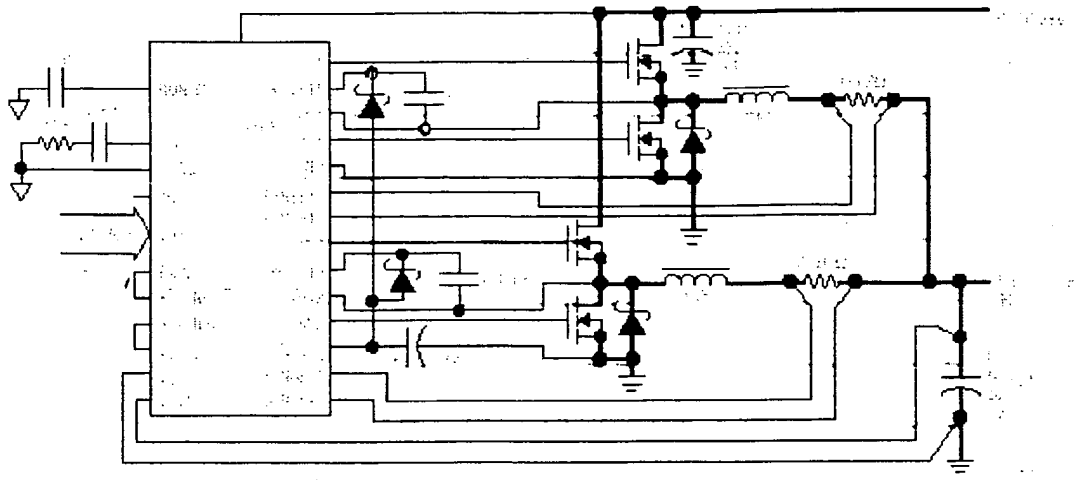

Figure 1. High Current Dual Phase Step-Down Converter